EXHIBIT A

INTEL CONFIDENTIAL

INTEL INVENTION DISCLOSURE

P7165

LEGAL ID# 11394 TMG/TM Comm / TMG/ ATD DATE: [redacted]

It is important to provide accurate and detailed information on this form. The information will be used to evaluate your invention for possible filing as a patent application. When completed, please return this form to the **Legal Department at JF3-147**. If you have any questions, please call **264-0444 or 264-0998**.

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2. Inventor: _____Goodman_____ _____~~Jack~~ L._____ _____E. J._____
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   Supervisor*__Brian Deford_____ WWID ___10031635_____ Phone __602/554-2921 M/S: ___ CH5-157_____

(PROVIDE SAME INFORMATION AS ABOVE FOR EACH ADDITIONAL INVENTOR)

2. Title of Invention: _____Folded Fin Fan Sink (FFF-Sink)_____

3. What technology/product/process (code name) does it relate to: ____Willamette_____

4. Stage of development (i.e. % complete) _____25%_____

5. (a) Has a description of your invention been, or will it shortly be, published outside Intel:

   NO: __X__ YES: _____ DATE WAS OR WILL BE PUBLISHED: _____
   If YES, was the manuscript submitted for pre-publication approval? YES: _____ NO:_____

   (b) Has your invention been used/sold or planned to be used/sold by Intel or others?

   NO: __X___ YES: _____ DATE WAS OR WILL BE SOLD: ___Under Evaluation for Intel Use_____

   (c) Does this invention relate to technology that is or will be covered by a SIG (special interest group)/standard/ or specification?

   NO: __X___ YES: _____ Name of SIG/Standard/Specification: _____

   (d) If the invention is a semiconductor device, actual or anticipated date of tapeout? _____

   (e) If the invention is software, actual or anticipated date of any beta tests. _____

6. Was the invention conceived or constructed in collaboration with anyone other than an Intel blue badge employee or in performance of a project involving entities other than Intel, e.g. government, other companies, universities or consortia?

   NO: _X___ YES: _____ Name of individual or entity: _____

1. Describe in detail how the invention works.

A fan-sink has two fundamental components, namely a heat sink and a fan. The fan is typically mounted to the top of the heat sink (see figure 1).

When a folded fin arrangement is used the airflow is ordinarily directed parallel to the cooling fins and parallel to the heat spreader base for optimum cooling fin exposure. A standard fan sink however, requires the airflow to be directed normal to the heat spreader base (see figure 1). This arrangement is not favorable for the basic folded fin because the cooling fins will only realize half of their potential (forced air) exposure (see figure 3).

Optimal fin exposure (to airflow normal to the heat spreader base) is realized by trimming the folded fins (as shown in figures 1-3). With this modification, forced air from the top of the heat sink is allowed to encounter all surfaces of the cooling fins.

Compared to the unmodified (untrimmed) folded fin fan sink, the modified is markedly more efficient (in the range of 50).

Trimming the folded fins may be accomplished in several ways including:

- Fly-cut the folded fins in a post-folded condition.
- Stamp out slots in the fin material prior to the folding operation. This is the basis of our invention.

Folded fin fan heat sinks are currently manufactured by creating the folded fin bundles on automation equipment and attaching them to a base spreader plate. The slots forair flow passages at the tops of the folds are created through a post-assembly operation. The folding automation equipment is adjustable to allow for different fin heights, thickness and fin pitch, but once set up it typically is not readjusted until a new batch of fin bundles are to be created. A continuous (typically coil) of fin sheet stock is fed into the equipment and is folded to the appropriate dimensions and cut to size. By placing cutting dies in the assembly line of the automated folding equipment the slots could be stamped in the desired places in the fin sheet stock before folding so that the opening would be positioned at the tops of the folds, eliminating the post assembly cutting of the assembled heat sink. This same technique could be used to pre-place cutouts for mounting screws, or any other open-type features in the fin bundles.

2. Describe advantage(s) of your invention over what is done now.

The primary advantage of the FFF-Sink (over standard fan-sinks) is optimal cooling fin density at the lowest cost. Since the FFF-Sink is an assembly, there are a number of operations to complete the manufacturing of such a heat sink. This invention cuts number of post-assembly operations (namely the fly-cutting of the slots) by replacing it with a pre-assembly operation. The switch involved can reduce the total cost in two ways: 1) the pre-assemble operation becomes part of the folded fin automation set-up saving a post operation set-up and reducing assembly time, and 2) the possibility of an assembled heat being damaged, resulting in reduced yield and high scrap is eliminated.

Listed below are standard fan-sinks and correlating advantaged of the FFF-Sink

Heat Sink Type	Advantage(s) FFF-Sink
Extruded	1) Aspect ratio of FFF-Sink is much better, 20-30 to 1, as opposed to 10 to 1 for extruded--improved efficiency 2) use of variant material heat spreader base is possible with FFF-Sink allowing more flexible heat spreading

Single Fin, Bonded Fin	1) FFF-Sink less expensive because folded fin much easier to assemble to spreader base than single fin (one piece to assemble instead of 20 plus)

3. **Include at least one figure illustrating the invention. If the invention relates to software, include a flowchart or pseudo-code representation of the algorithm.**

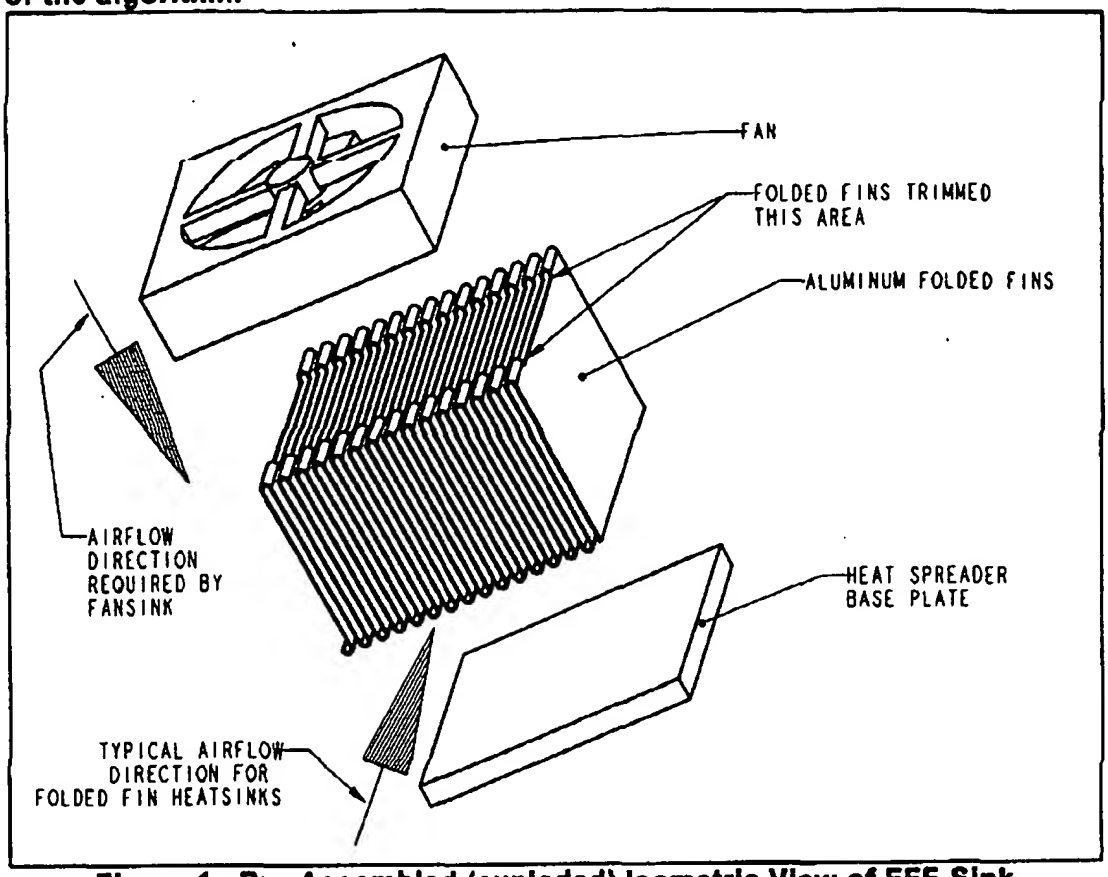

Figure 1. Pre-Assembled (exploded) Isometric View of FFF-Sink.

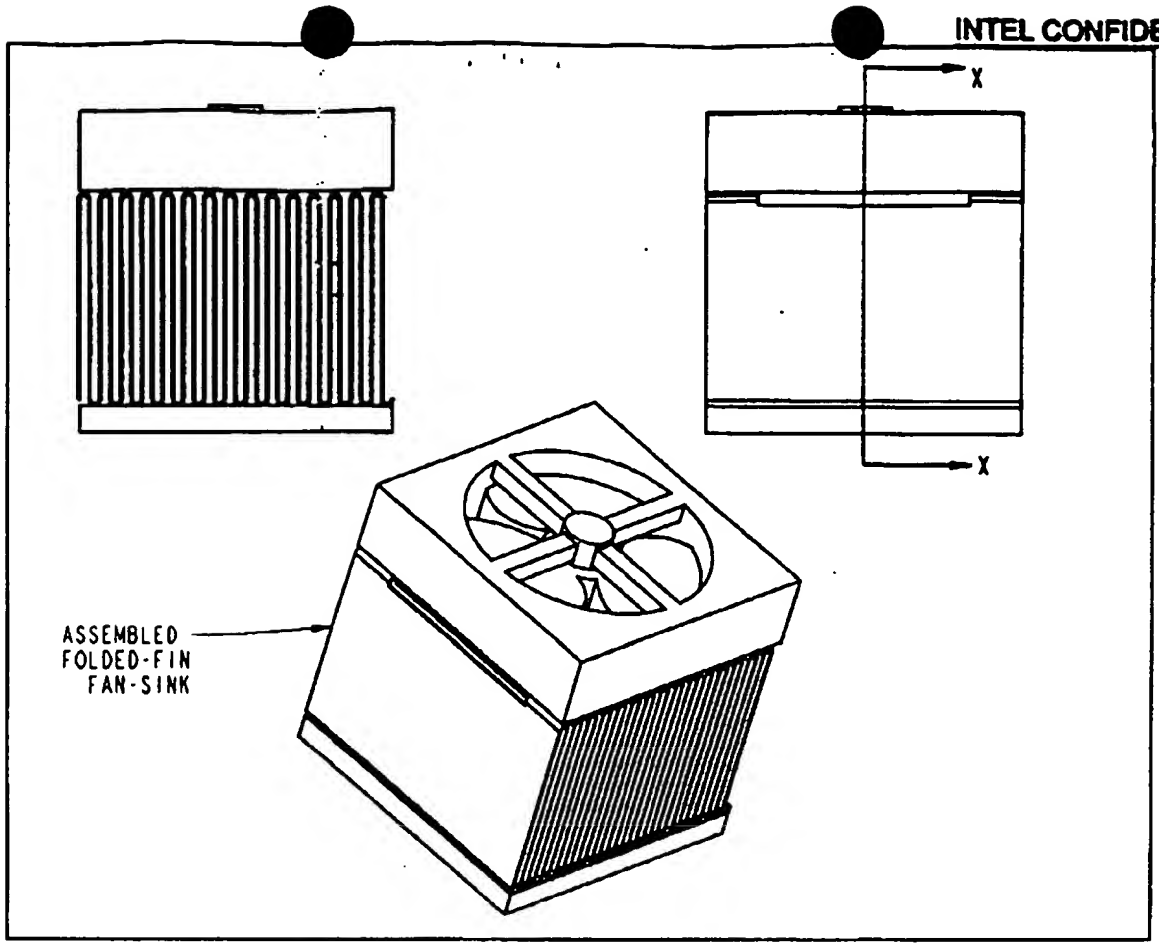

Figure 2. Assembled Isometric View of FFF-Sink.

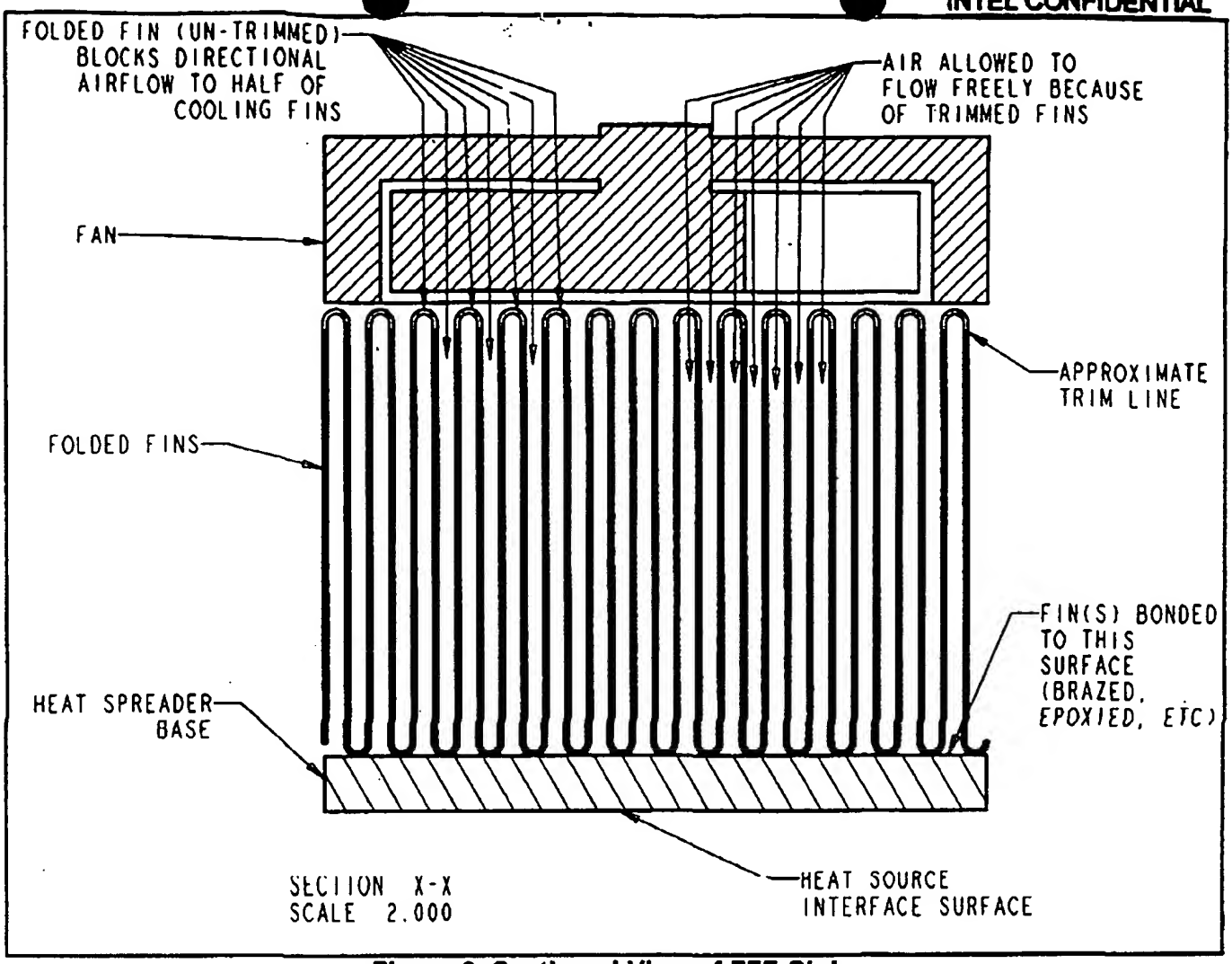

Figure 3. Sectioned View of FFF-Sink

4. Value of your invention to Intel (how will it be used?).

The FFF-Sink is currently in urgent demand for the Willamette (development underway) generation of desktop/server products. The current design target is 70 watts with a push to a 5 watt added delta (75W). Thermal cooling solutions with high efficiency and low cost are critical to the success of this product, as well as follow-on products.

The FFF-Sink may also be adapted for other high-wattage/limited-space microprocessors as required such as McKinley.

Willamette will use the FFF-Sink as a complete CPU/cooling-solution package and/or enabled for Intel Corp. customers (OEM's) to deploy in their products.

5. Identify the closest or most pertinent prior art that you are aware of.

As noted in section 2, there are two (fundamental) existing fan-sink (heat sink) variations:

1) Extruded heat sink (typically aluminum) with attached fan
2) Single-Fin bonded fin heat sink (typically aluminum) with attached fan

6. **Who is likely to want to use this invention or infringe the patent if one is obtained and how would infringement be detected?**

Competition in the CPU segment (desktop and server), and their thermal solution suppliers.

***HAVE YOUR SUPERVISOR READ, DATE AND SIGN COMPLETED FORM**

DATE: [redacted] SUPERVISOR: c Michael Hamer

BY THIS SIGNING, I (SUPERVISOR) ACKNOWLEDGE THAT I HAVE READ AND UNDERSTAND THIS DISCLOSURE, AND RECOMMEND THAT THE HONORARIUM BE PAID